

Solvents

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Table 16. Miscibility of solvents with water (wt % at 20 °C)

Solvent	Solvent in water	Water in solvent
Hexane	0.53	0.1
Tetrahydronaphthalene		0.2
Dipentene		0.72
Toluene	0.035	0.05
p-Xylene	0.02	0.02
Ethylbenzene	0.02	0.02
Styrene		0.04
Methanol	∞	∞
Ethanol	∞	∞
Propanol	∞	∞
Isopropyl alcohol	∞	∞
Butanol	7.5	19.7
Isobutanol	8.4	16.2
sec-Butanol	12.5	44.1
tert-Butanol	∞	∞
Hexanol	0.58	7.2
Trimethylcyclohexanol	0.19	4.0
Cyclohexanol	3.6	3.6
Methylbenzyl alcohol	2.9	5.8
Ethylene glycol	∞	∞
Methyl glycol	∞	∞
Ethyl glycol	∞	∞
Propyl glycol	∞	∞
Butyl glycol	∞	∞
Ethyl diglycol	∞	∞
Methoxypropanol	∞	∞
Methyldipropylene glycol	∞	∞
Nitroethane	4.5	0.9
1-Nitropropane	1.4	0.5
2-Nitropropane	1.7	0.6
Diethyl ether	6.9	1.2
Dibutyl ether	0.3	0.2
Methyl tert-butyl ether	4.8	1.3
Tetrahydrofuran	∞	∞
Dioxane	∞	∞
Methyl acetate	24.0	8.0
Ethyl acetate	6.1	3.3
Isopropyl acetate	2.9	1.9
Butyl acetate	0.83	0.62
Isobutyl acetate	0.67	1.65
Ethyl glycol acetate	23.5	6.5
Butyl glycol acetate	1.5	1.7
Cyclohexyl acetate	0.2	0.5
Butyl glycolate	7.5	25.0
Propylene carbonate	21.4	7.5
Acetone	∞	∞
Methyl ethyl ketone	26.0	12.0
Methyl isobutyl ketone	2.0	2.4
Diisobutyl ketone	0.04	0.42
Cyclohexanone	2.3	8.0
Isophorone	1.2	4.3
Trimethylcyclohexanone	0.3	1.4
Diacetone alcohol	∞	∞
Dichloromethane	2.0	0.16
1,1,1-Trichloroethane	0.44	0.05
Trichloroethylene	0.1	0.02
Tetrachloroethylene	0.02	0.01
Dimethylformamide	∞	∞
Dimethyl sulfoxide	∞	∞

9.2. Cycloaliphatic Hydrocarbons

The solvency of cycloaliphatic hydrocarbons is between that of aliphatic and aromatic hydrocarbons. They have a high solvency for fats, oils, oil-modified alkyd resins, styrene-modified oils and alkyd resins, bitumen, rubber, and other polymers. Polar resins (e.g., urea-, melamine-, and phenol-formaldehyde resins), as well as alcohol-soluble synthetic resins and cellulose esters are, however, insoluble.

Cycloaliphatic hydrocarbons are miscible with most other solvents, but are insoluble in water.

Cyclohexane [110-82-7] is a water-clear, colorless liquid with a gasoline-like smell; it is miscible with most organic solvents except methanol, dimethylformamide, and solvents of similar polarity (→ Cyclohexane).

Methylcyclohexane [108-87-2] is similar to cyclohexane but less volatile (→ Cyclohexane, A 8, p. 215).

1,2,3,4-Tetrahydronaphthalene [119-64-2] (tetralin) is an aromatic-cycloaliphatic hydrocarbon. It is a colorless liquid with a naphthalene-like odor, insoluble in water, and miscible with all common organic solvents (→ Naphthalene and Hydronaphthalenes, A 17, p. 6). It dissolves fats, oils, linoleum, rubber, waxes, asphalt, bitumen, pitch, tar, phenol, naphthalene, iodine, sulfur, etc., and is used on a large scale in painting work, and in floor wax and shoe polish production. It also dissolves colophony, Congo copals, glyptal resins, coumarone resins, ketone-formaldehyde resins, and aminoplasts. It imparts good flow properties to paints and produces high-gloss, smooth film surfaces. It is autooxidative and thus acts as an oxygen carrier in drying oils.

Decahydronaphthalene [91-17-8] (decalin) is a colorless solvent with a pungent odor and fairly high volatility, its solvency is somewhat lower than that of tetrahydronaphthalene (→ Naphthalene and Hydronaphthalenes, A 17, p. 6).

9.3. Terpene Hydrocarbons and Terpenoids

Turpentine oil [8006-64-2] (DIN 53248). Only pure etheral oil obtained from the distillation of the resinous secretion of living pine trees, and from which no valuable constituents (e.g.,